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EXAMINER	
CHEN, WENPENG	
ART UNIT	**PAPER NUMBER**
2624	

DATE MAILED: 09/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/849,502	Applicant(s) LEE ET AL.	
	Examiner Wenpeng Chen	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 June 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,7-11,13-21,23-27 and 30-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7-11,13-21,23-27 and 30-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/29/2005 has been entered.

Examiner's responses to Applicant's remark

2. Applicant's amendments have been considered. They overcome the following set forth in paper #20050201 mailed on 2/4/2005:

-- objection to Claim 31;

-- rejections to Claims 1-8, 18-23, and 30-33 under 35 U.S.C. 112, first paragraph.

3. Applicant's arguments with respect to claims 1, 9, 13,18, and 24 have been considered but are moot in view of the new ground(s) of rejection due to the amendment. The change of scope of the claims was explained in Office Action paper #20050512 mailed on 5/17/2005.

Claim Objections

4. Claim 31 is objected to because of the following informalities:

-- There is "a a" at the end of line 1 in Claim 31. One of them shall be deleted..

Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 5, 7-8, 18-19, 23, and 30-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Astle (US patent 6,026,190 cited previously) in view of Sugiyama (US patent 5,089,889.)

For Claims 1 and 5, 7, 30-31, Astle teaches, in a computer system with a video encoder, a method for regulating level of a buffer storing compressed video information for the video encoder, the method comprising:

-- determining an indicator value with a level of a buffer for a video encoder; (Fig. 3; column 6, line 1-12)

-- based at least in part upon the indicator value, adjusting median filtering of video information; (Fig. 3; column 6, lines 27-32; column 10, lines 55-65)

-- wherein the determining and the adjusting occur on a frame-by-frame basis; (column 12, lines 1-24)

-- wherein the median filtering the video information includes median filtering intra-coded pixel data; (column 5, lines 60-64; intra-frame encoding)

-- wherein the indicator value is based on at least in part on a perceptual quality measure. (column 6, lines 1-12; The buffer fullness determines a bitrate and quantization level which in the decoding side decide the quality of the recovered image perceived by an user. The buffer fullness is thus a perceptual quality measure.)

For Claim 8, Astle also teaches a computer readable medium storing instructions for causing a computer programmed thereby to perform the method of claim 1. (column 4, lines 32-50; host memory 126)

For Claims 18-19 and 23, Astle also teaches a computer readable medium (host memory 126) storing instructions for causing a computer programmed thereby to perform a method of controlling bitrate of information in an encoder, the method comprising:

-- receiving a bitrate indicator for filtering a set of information, the received bitrate indicator indicating a bitrate goal for the set of information, the bitrate indicator based upon level of a buffer; (Fig. 3; column 6, line 1-12)

-- based at least in part upon the received bitrate indicator, adjusting kernel-based filtering of the set of information, wherein a kernel defines a neighborhood of values for the kernel-based filtering, wherein the filtering is median filtering, (a) wherein the adjusting comprises changing the kernel based upon the received bitrate indicator; (column 10, lines 55-65; Fig. 3; column 6, lines 27-32; column 12, lines 18-40; column 11, lines 15; The kernel has a 3x3 area. The strength S is adjusted. The filter tap ratio defines the kernel)

-- wherein the set of information is for a video sequence, and wherein the receiving and the adjusting occur for each new set of information for the video sequence. (column 12, lines 1-24)

Astle further teaches the feature that:

-- wherein the low-pass filtering video information for rate control is also applied to inter-frame coding. (column 5, lines 45-64; column 12, lines 1-17; A previous frame is utilized to predict how to encode the current frame. Encoding system 100 may utilize a low-pass filter 303 to control the bit rate of the output bitstream representing compressed video frames. An inter-frame encoding includes a prediction residual. The filtering is applied before DCT transform.)

It is well known, in the inter-frame coding, that a prediction residual is supplied to DCT transform. However, Astle is not clear that, in an inter-frame coding mode, the digitized video image signal of 301 of Fig. 3 is a current frame or a prediction residual frame. In the previous Office action, the Examiner interpreted that the video image signal can be a prediction residual frame and concluded that Astle also teaches median filtering the prediction residual. The Applicant argued that the video image signal is a current frame and cannot be read as a prediction residual frame. To simplify the examination process, the Examiner will take the Applicant's interpretation and provide the following conclusion.

Let us take the Applicant's position and say that Astle does not teach the feature related to "median filtering a prediction residual."

Sugiyama teaches inter-frame predictive encoding system and method for controlling data rate, comprising:

-- spatial filter means for filtering the prediction error signal to alter a frequency characteristic for rate control. (element 3 in Figs. 2-3; column 7, lines 17-48; column 8, lines 14-54)

It is desirable to control bit rate of a prediction error signal without significantly reducing the resolution of an image as pointed out by Sugiyama. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply Sugiyama's teaching to filtering a prediction error signal in Astle's system because the combination minimizes degradation of decoded inter-coded frames. The combination thus teaches:

-- wherein the median filtering the video information includes median filtering a prediction residual.

7. Claims 2-3, 9, 11, 13-16, 20, 24-26, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Astle and Sugiyama, and further in view of Chan et al. (US patent 4,334,244) and Russ ("The Image Processing Handbook," 2nd edition, CRC Press, 1994, pages 164-166.)

As discussed above, the combination of Astle and Sugiyama teaches parental Claims 1 and 18. The combination evidently also teaches the recited limitations of Claims 9, 13, and 24 and their dependent claims except those discussed below.

For Claims 13-16, the combination of Astle and Sugiyama also teaches a computer readable medium storing instructions for causing a computer programmed thereby to perform a method of regulating lossy compression of video information in a video encoder, the method comprising:

-- during lossy compression of a set of video information, intermittently changing a kernel for filtering the set of video information, wherein the kernel defines a neighborhood of values for the filtering, the kernel selected from plural available kernels including at least a first kernel and a second kernel, the first kernel for decreasing quality and bitrate, and the second kernel for preserving quality and increasing bitrate, (a) wherein the changing is based upon a quality constraint for the set of video information, (b) wherein the changing is based upon a bitrate constraint for the set of video information, wherein the median filtering the video information includes median filtering a prediction residual; (Astle: Fig. 3; column 6, lines 27-32; column 10, lines 55-65; column 12, lines 18-40; column 11, lines 15; The filter tap ratio defines the kernel.)

-- using the kernel to filter the set of video information. (Astle: column 5, lines 60-64; See discuss above.)

For Claim 24-26, the combination of Astle and Sugiyama also teaches, in a computer system, an encoder with a bitrate adaptive filter for filtering information, the encoder comprising:

-- a bitrate adaptive filter for filtering information, wherein the bitrate adaptive filter is a bitrate adaptive low pass filter; (Astle: Fig. 3; column 6, lines 27-32; column 10, lines 43-54)

-- a frequency transformer for transforming filtered information into the frequency domain; (column 5, lines 45-64; DCT)

-- a quantizer for quantizing frequency transformed information, wherein the quantizer is a bitrate adaptive quantizer; (Astle: column 5, line 45 to column 6, line 12)

-- an entropy coder for entropy coding quantized information; (Astle: column 5, lines 45-64; run-length coding)

-- a buffer for buffering entropy coded information, wherein the bitrate adaptive filter adjusts filtering in relation to level of the buffer; (Astle: Fig. 3; column 6, lines 1-12, 27-32; column 10, lines 55-65)

-- wherein filtering the information includes filtering intra-coded pixel data and a prediction residual. (Astle: column 5, lines 60-64; column 5, lines 60-64; intra-frame encoding; An inter-frame encoding includes a prediction residual. See the above explanation.)

Although the combination of Astle and Sugiyama teaches "changing the strength of low-pass filtering based upon an indicator value with a level of a buffer", it does not teach explicitly the feature related to (1) "changing the kernel of median filtering based upon the indicator value of the buffer," and (2) "kernel shape."

Chen teaches that the strength of a median filter depends on the size and shape of the median filter. (column 5, lines 65 to column 6, line 1)

Russ teaches median filters with various kernel size and shape, wherein the median filtering includes: sorting n input values, wherein n is an odd number greater than 2; and selecting an output value that is the middle value of the sorted input values. (Fig. 11, page 165; As also evident in Fig. 10, page 164 of Russ, the strength of filter (c) having 21 pixels of Fig. 11 is larger than that of filter (b) having 9 pixels of Fig. 11, because Fig. 10(d) corresponding to filter (c) had less noise dots than Fig. 10(c) corresponding to filter (b). Of course, both noises of Figs. 10(c) and 10(d) are smaller than that of Fig. 10(b) which corresponds to case without any filtering.)

It is desirable to have flexibility to select various low-pass filtering with adjustable strength. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply the combined teaching of Chan and Russ to add Russ's approach to include median filtering in which the kernel of median filtering is changed in size and shape" as additional low-pass filtering in the method taught by the combination of Astle and Sugiyama, because the combination of Astle, Sugiyama, Chan and Russ provides flexibility in bit rate control.

Because the five median filters of Fig. 11 of Russ are discrete, it would have been obvious to one of ordinary skill in the art, at the time of the invention that each filter represents a discrete range of strength of filtering. Once the strength of filtering for bit rate control is determined in Astle, the type of filter (or no filtering) will be selected from Fig. 11 of Russ. Therefore, the overall combination teaches:

-- based at least in part upon the indicator value, adjusting median filtering of video information;

-- wherein a kernel defines a neighborhood of values for the median filtering, and wherein the adjusting comprises changing the kernel based at least in part upon the indicator value;

-- wherein the changing comprises: if the indicator value is within a first range, selecting a first kernel; and if the indicator value is within a second range, selecting a second kernel;

-- wherein the median filtering video information includes median filtering intra-coded pixel data;

-- wherein the median filtering video information includes median filtering a prediction residual;

-- during lossy compression of a set of video information, intermittently changing a kernel for filtering the set of video information, wherein the kernel defines a neighborhood of values for the filtering, the kernel selected from plural available kernels including at least a first kernel with a first kernel shape and a second kernel with a second kernel shape different than the first kernel shape, the first kernel for decreasing quality and bitrate, and the second kernel for preserving quality and increasing bitrate;

-- wherein a kernel defines a neighborhood of values for the bitrate adaptive filter, and wherein the bitrate adaptive filter adjusts filtering by changing shape of the kernel.

Because Astle also teaches a video encoder with bit rate control, the teachings of the combination of Astle, Sugiyama, Chan, and Russ as discussed above evidently teach all features recited in Claims 9 and 11.

8. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (pages 2-3) in view of the combination of Astle, Sugiyama, Chan and Russ.

The admitted prior art teaches an encoder for bit rate control wherein the information is for plural frames of a video sequence, and wherein the encoder drops information for one or more of the plural frames when the buffer approaches fullness. (page 2, line 16 to page 3, line 2)

However, the admitted prior art dose not teaches the features of the parent Claim 26 of Claim 27.

As discussed above, the combination of Astle, Sugiyama, Chan and Russ teaches all the features recited for Claim 26.

It is desirable to maintain quality of a video as much as possible. One way to achieve this object is to minimize the number of dropped frames. With the bit rate control based on adaptive filtering, there is less chance the buffer will be full. As a consequence, there will be fewer frames to be dropped. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply the bit rate control taught by the combination of Astle, Sugiyama, Chan and Russ to the encoder of the admitted prior art to further control the generated bits, because the combination maintains better quality of a video.

9. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (pages 2-3) in view of the combination of Astle, Sugiyama, Chan and Russ.

The admitted prior art teaches an encoder for bit rate control wherein the information is for plural frames of a video sequence, and wherein the encoder drops information for one or more of the plural frames when the buffer approaches fullness. (page 2, line 16 to page 3, line 2)

However, the admitted prior art dose not teaches the features of the parent Claim 9 of Claim 10.

As discussed above, the combination of Astle, Sugiyama, Chan and Russ teaches all the features recited for Claim 9.

It is desirable to maintain quality of a video as much as possible. One way to achieve this object is to minimize the number of dropped frames. With the bit rate control based on adaptive filtering, there is less chance the buffer will be full. As a consequence, there will be fewer frames to be dropped. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply bit rate control taught by the combination of Astle, Sugiyama, Chan and Russ to the encoder of the admitted prior art to further control the generated bits, because the overall combination maintains better quality of a video.

10. Claims 4 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Astle, Sugiyama, Chan and Russ in view of Fukuda (US patent 5,625,714 cited previously.)

The combination of Astle, Sugiyama, Chan and Russ as discussed above teaches the parental Claims 1 and 18. Although the combination teaches "changing the strength of median filtering based upon the determined level of the buffer", it does not teach the feature related to " the adjusting comprises changing a number of times for the median filtering of the video information."

Fukuda teaches "adjusting the strength of an overall median filtering with changing a number of times for small-size median filtering." (column 18, lines 1-21)

It is desirable to have flexibility to select various ways for adjusting the strength of median filters. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to add Fukuda's approach to change times of small-size median filtering as a way for changing the strength of an overall median filtering taught by the combination of Astle, Sugiyama, Chan and Russ, because the combination provides flexibility in bit rate control.

11. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Astle, Sugiyama, Chan and Russ in view of Sun et al. (US patent 5,969,764 cited previously.)

The combination of Astle, Sugiyama, Chan and Russ as discussed above teaches the parental Claim 13. However, it does not teach the feature related to video object.

Sun teaches coding video objects. (column 4, lines 24-51; VO)

It is desirable to extend rate control to various kinds of image compression. It would have been obvious to one of ordinary skill in the art, at the time of the invention, to apply the bit rate control approach taught by the combination of Astle, Sugiyama, Chan and Russ to control bit rate of coding video objects taught by Sun, because the combination extend Astle's application to compression using video objects. The advantages of using Astle's approach are discussed in columns 1-2 of Astle.

12. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Astle, Sugiyama, Chan and Russ in view of Mori et al. (US 6,556,925.)

The combination of Astle, Sugiyama, Chan and Russ as discussed above teaches the parental Claim 1. However, it does not teach the feature related to the median filter with an even number of input values.

Mori teaches median filtering with odd and even numbers of values,

-- wherein the median filtering includes: sorting n input values, wherein n is an odd number greater than 2; and selecting an output value that is the middle value of the sorted input values. (column 9, line 66 to column 10, line 5)

It is desirable to extend rate control for various kinds of median filters including those of even values. It would have been obvious to one of ordinary skill in the art, at the time of the

invention, to add even-number median filters to as one approach for the bit rate control taught by the combination of Astle, Sugiyama, Chan and Russ, because the combination broadens the application of the method taught by the combination.

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wenpeng Chen whose telephone number is 571-272-7431. The examiner can normally be reached on 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K Moore can be reached on 571-272-7437. The fax phone numbers for the organization where this application or proceeding is assigned are 571-273-8300 for regular communications and 571-273-8300 for After Final communications. TC 2600's customer service number is 571-272-2600.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2600.

Wenpeng Chen
Primary Examiner
Art Unit 2624

August 29, 2005